Notes:
1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

Translated: 23:04:50 JST 11/14/2008
Dictionary: Last updated 10/08/2008 / Priority: 1. Chemistry / 2. Mechanical engineering / 3. Technical term

---

FULL CONTENTS

[Claim(s)]
[Claim 1] [the electrodialyzer which uses the cation exchange membrane which makes a }monovalent ion penetrate selectively as cation exchange membrane] The manufacture method of the mineral drink characterized by diluting with pure water until it reaches the range whose hardness of this mineral water is 100-2000mg/l., after supplying seawater, desalting until that electrical conductivity reaches the range of 5 - 20 mS/cm, and considering it as mineral water.
[Claim 2] The manufacture method of the mineral drink according to claim 1 characterized by being the anion exchange membrane in which the anion exchange membrane used for an electrodialyzer does not have the characteristics of making a }monovalent ion penetrating selectively.

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the manufacture method of a drink that a mineral ingredient can be supplied effectively.
[0002]
[Description of the Prior Art] Although the drink marketed is various, the health drink which contains neither saccharides nor caffeine has been collecting the consumer's popularity recently. The drink which contains indispensable minerals especially said that it is needy to Japanese people, such as magnesium and calcium, also in this health drink is attracting attention. In order to supply a mineral ingredient conventionally, the method of using seawater is proposed (JP,60-255729,A number). This will use the electrodialyzer incorporating the shade and cation exchange membrane of the seawater discharged in the case of salt manufacture by an ion exchange membrane, i.e., }monovalent ion selectivity, and will use effectively the blowdown seawater desalted to about 40 mS/cm from the seawater whose electrical conductivity of seawater is about 50 mS/cm. However, the presentation of the drink illustrated here contains high-concentration sodium ion with a bivalence ion (mineral ingredient), and has not satisfied the claim of wanting to supply only a mineral ingredient. Moreover, it desalts efficiently and the approach for manufacturing a drink is indicated. [0003]
[Problem(s) to be Solved by the Invention] The object of this invention is to offer the method of manufacturing efficiently the drink which can supply mineral ingredients, such as magnesium and

calcium, effectively.
[0004]
[Means for Solving the Problem] This invention relates to the efficient manufacture method of a mineral drink that a required indispensable mineral can be effectively supplied on healthy. [this invention / namely, the electrodialyzer which uses the cation exchange membrane which makes a }monovalent ion penetrate selectively as (1) cation exchange membrane] After supplying seawater, desalting until the electrical conductivity reaches the range of 5 - 20 mS/cm, and considering it as mineral water, [the anion exchange membrane used for the manufacture method (2) electrodialyzer of the mineral drink characterized by diluting with pure water until it reaches the range whose hardness of this mineral water is 100-2000mg/l.] It is related with the manufacture method of the mineral drink according to claim 1 characterized by being anion exchange membrane without the characteristics of making a }monovalent ion penetrating selectively.
[0005] Face this invention desalting seawater using the cation exchange membrane (following and } monovalent ion selectivity cation exchange membrane) which makes a }monovalent ion penetrate selectively, and it does not desalt only with an electrodialyzer to a grade suitable for a drink. Moreover, it is based on having found out that the mineral drink which does not limit by slight demineralization, either, controls the grade of demineralization moderately like salt manufacture, and does not contain salinity too much by carrying out dilution adjustment of the desalted water with pure water could be manufactured efficiently.
[0006] Generally the electrodialyzer used by this invention is used for the object of demineralization, and it is easy to use it combining anion exchange membrane and cation exchange membrane. However, the cation exchange membrane used is limited to }monovalent ion selectivity cation exchange membrane. This }monovalent ion selectivity cation exchange membrane is cation exchange membrane used with salt manufacture by an ion exchange membrane process, and means cation exchange membrane with the characteristics of making a }monovalent cation penetrating preferentially. It is desirable to use the higher cation exchange membrane of these }monovalent ion choice characteristics especially. That is, it is desirable that the F binary which later defines is 0.3 or less, and 0.13 or less are still more desirable.
[0007] the ratio of a bivalence cation to the }monovalent cation of the cation exchange membrane in the concentration of seawater which assumed the salt manufacture using an ion exchange membrane to be F2 although given by (1) formula -- permselectivity is shown and it means that }monovalent cation permselectivity is so high that this value is low.
[0008]
[Formula 1]

$$F_2 = \frac{C_{(Ca^{2+}+Mg^{2+})} / C_{(Na^{+}+K^{+})}}{D_{(Ca^{2+}+Mg^{2+})} / D_{(Na^{+}+K^{+})}} \quad \text{式(1)}$$

$C_{(Ca^{2+}+Mg^{2+})}$：濃縮液のCa^{2+}とMg^{2+}の濃度の和

$C_{(Na^{+}+K^{+})}$：濃縮液のNa^{2+}とK^{2+}の濃度の和

$D_{(Ca^{2+}+Mg^{2+})}$：濃縮液のCa^{2+}とMg^{2+}の濃度の和

$D_{(Na^{+}+K^{+})}$：濃縮液のNa^{+}とK^{+}の濃度の和

[0009] Moreover, the anion exchange membrane which anion exchange membrane makes penetrate a } monovalent ion selectively The anion exchange membrane which may be (following and }monovalent ion selectivity anion exchange membrane), and does not have the characteristics of making a } monovalent ion penetrating selectively Although you may be (non-[the following and] }monovalent ion selectivity anion exchange membrane), since sulfate ion and chlorine ion are equally removable, the non-}monovalent ion selectivity anion exchange membrane is more desirable. Which water depth deep sea water of the seawater used by this invention that took in water from depth deeper than 170m with few suspended matters and toxic substances although it could reach and the thing of ocean space could be used is desirable. In this invention, the demineralization step of the seawater is carried out first, and mineral water is manufactured. The demineralization step for manufacturing mineral water is desalted until the electrical conductivity of the desalted water reaches the range to 5 - 20 mS/cm. If it desalts exceeding 5 mS/cm, very long time will be required and efficiency will worsen. Moreover, if demineralization is stopped before electrical conductivity reaches 20 mS/cm, clearance of sodium ion becomes imperfect and the drink which supplies only a mineral ingredient cannot be made. The electrical conductivity at the time of still more desirable demineralization is the range of 7 - 15 mS/cm. In addition, since electrical conductivity is generally greatly influenced by measurement temperature, it shows what was measured at 25 degrees C in the Description of this invention.

[0010] Next, the obtained mineral water is diluted with pure water, and a mineral drink is manufactured. Compared with mineral water after the pure water used by this invention desalts seawater, electrical conductivity means 1/10 or less water. You may be water which carried out deionization with the ion exchange resin, and tap water is sufficient as long as it satisfies even electrical conductivity. Of course, although you may be water which filtered seawater by the reverse osmotic membrane, a manufacturing cost becomes high compared with others which were illustrated here.

[0011] The grade of dilution is performed until the hardness of a mineral drink reaches the range of 100-2000mg/l. When only a drink with bad efficiency of mineral makeup [mg //l. / less than 100] is obtained and l. is exceeded in 2000mg /, the bitterness of mineral origin stops being suitable for increase and a drink. The hardness of a still more desirable mineral drink is the range of 200-1000mg/l. Moreover, the Na concentration of the mineral drink manufactured by this invention is desirable in 200mg/l. or less, and its l. is still more desirable in 100mg /or less. In addition, treatment can be further added to the mineral drink obtained by this invention, and the still better characteristics as a drink can be given. For example, it is also possible to sterilize after beverage production in a beverage production process or to

give seasoning like what is called an isotonic drink again.
[0012]
[Embodiment of the Invention] Next, although the mode of operation of this invention is concretely explained based on a work example and a comparative example, this invention is not limited to these. First, the common experimental condition in the inside of a work example and a comparative example is explained. [the cartridge (layered product of an ion exchange membrane) which the electrodialyzer used for demineralization is ASAHI KASEI KABUSHIKI KAISHA micro reed riser S3 type, and was used] [the }monovalent ion selectivity cation exchange membrane K192 (F2=0.08), AC120-550 (F2=0.08) incorporating non-}monovalent ion selectivity anion-exchange-membrane A501SB, the }monovalent ion selectivity cation exchange membrane K192 (F2=0.2), and anion-exchange-membrane A501SB] It is AC220-550 incorporating AC120-550 (F2=0.2) and non-}monovalent ion selectivity cation-exchange-membrane K501SB which were incorporated, and anion-exchange-membrane A501SB.
[0013] 800ml of seawater which took in water from the depth of 300m was used for the demineralization liquid in early stages of operation. 500ml of deionized water was used for the concentrate in early stages of operation, and the impressed voltage made it it with 10V immobilization. The water which carried out deionization of the tap water with the DEMIESU DY-15 type ion exchange resin was used for the pure water used for dilution of the seawater (mineral water) which ended demineralization. Although the hardness of this deionized water was analyzed with the EDTA titrimetric method and sodium ion concentration was analyzed by the ion chromatography method, it was 1mg/l. or less, respectively. In addition, an EDTA method is a method of searching for underwater calcium ion and the amount sum of magnesium ions by titration, and the acquired amount sum of ions is converted into CaCO3, and it displays in the unit of mg/a liter.
[0014] Moreover, hardness of the drink after demineralization dilution (mineral drink) and sodium ion concentration analysis were also conducted by the same method as the above. Five adult men and women sampled each the sample appraisal method of the mineral drink, and it summarized the evaluated result and showed in front the evaluation result which got a majority with the following signs.
O as :mineral drink -- drink possible x: -- there is bitterness -- as a drink -- unsuitable -: -- it was salty, and as shown in the unsuitable demineralization work examples 1-5 as a drink, assessment good as a drink was obtained in the range of this invention. What was diluted to hardness 2500 on the other hand as shown in a comparative example 1 brought a bitter-tasting result. Moreover, although the termination electrical conductivity of demineralization was highly set up with 22 mS/cm in the comparative example 2, the assessment when making it a drink brought a salty result.
[0015] In the comparative example 3, although desalted using the cation exchange membrane of non-} monovalent selectivity, the assessment at the time of considering it as a drink brought a salty result. Although demineralization electrical conductivity was low set up with 4 mS/cm in the comparative example 4, the time which demineralization takes was excessively long and efficient demineralization was in the situation which cannot be said.
[0016]
[Table 1]

実施例or比較例	脱塩工程			希釈工程				ミネラル飲料の評価結果
	原料海水電気伝導度	脱塩終了電気伝導度	脱塩時間	カートリッジ	希釈倍率	希釈後硬度	Na濃度	
	mS/cm	mS/cm	min	—	—	mg/L	mg/L	
実施例1	55	10	60	AC120-550 (F2=0.08)	5	1000	30	○
比較例1	55	10	60	AC120-550 (F2=0.08)	2	2500	75	×
実施例2	55	10	60	AC120-550 (F2=0.2)	5	700	80	○
比較例2	55	10	60	AC220-550	5	200	400	●
実施例3	55	10	60	AC120-550 (F2=0.08)	10	500	15	○
実施例4	55	10	60	AC120-550 (F2=0.08)	50	100	3	○
比較例3	55	22	20	AC120-550 (F2=0.08)	6	1000	300	●
実施例5	55	10	60	AC120-550 (F2=0.08)	10	500	15	○
比較例4	55	4	180	AC120-550 (F2=0.08)	4	500	10	○

[0017]

[Effect of the Invention] By the manufacture method of a drink of having used the seawater of this invention, minerals contained in seawater, such as magnesium and calcium, can be used effectively, and there is also no adverse effect to the health of sodium chloride saltily, and the drink which is easy to drink can be manufactured efficiently.

[Translation done.]